

TITLE OF THE INVENTION

PROCESSED PRODUCTS INCLUDING MALT FROM  
SEED OF ONE OR MORE OF WHEAT, BARLEY, OATS AND RYE  
AND THEIR PROCESSING METHODS

5

BACKGROUND OF THE INVENTION

## 1. Field of the Invention

This invention generally relates to food  
or food products including malt which are  
10 manufactured with germinated seeds of one or more of  
wheat, barley, oats and rye. In more detail, this  
invention relates to food or food products which  
include high oligosaccharide contents, not by adding  
the oligosaccharide but by using malt obtained by a  
15 germination step, in which step seed of one or more  
of wheat, barley, oats and rye as a part of  
materials for food or food products are soaked in  
water or hot water for a predetermined time.

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## 2. Description of the Related Art

Conventionally, functional food products  
which are added as various ingredients in food have  
been selling in the marketplace. Recently and  
continuing, healthy intentions of consumers are  
25 increasing, and food or beverages which have added  
amino acids and dietary fibers as functional  
ingredients have been under development. For  
example, gamma-aminobutyric acid, one of free amino  
acids called GABA, is used. It is known that GABA  
30 acts as a neurotransmitter of a restraint system in  
the human body. In addition, it is known that GABA  
acts in depressing blood pressure, stabilizing the  
mind of human beings, improving kidney and liver  
functions, and promoting alcohol metabolism.  
35 Therefore, recently, functional food products  
including GABA are among the most attractive  
functional ingredients.

Dietary fibers such as  $\beta$ -glucan have various functions like operations to keep the bowels well-conditioned and restraint operations against high sugar levels in blood. So, water products including dietary fibers are manufactured.

Also, recently, oligosaccharide is one of important functional ingredients in the field of the food industry, and conventionally, various research efforts have been performed.

Various characteristics are reported about starch sugar or oligosaccharide provided by enzymatic decomposition of starch, and generally, as water retentiveness rises, the anti-crystallization effect is increased (see Non-patent document 1).

For example, compared to sugar, maltotetraose is superior in maintaining moisture and solubility, and is able to reduce degradation of starch. Also, because maltotetraose has superior characteristics for digestion and water-absorbing, it is used as sugar supplying energy for various sports drink and soft drinks as nutrition thereby attracting attention as sugar having functionality (see Non-patent document 2).

Accordingly, it is expected that food including oligosaccharide have superior characteristics, but in conventional technology, in order to manufacture soft drinks or food including oligosaccharide, a method is used in which mainly oligosaccharide itself is added to soft drinks or foods as food additives.

#### SUMMARY OF THE INVENTION

It is a general object of the present invention to provide food or food products which include high oligosaccharide contents, not by adding the oligosaccharide but by using malt obtained by a germination step, in which step seed of one or more

of wheat, barley, oats and rye as a part of materials for food or food products are soaked in water or hot water for a predetermined time.

5 In order to achieve the above-mentioned object, as described in claim 1, there is provided a method of processing food or food products,

characterized in that after seed of one or more of wheat, barley, oats and rye are soaked in water or hot water for a predetermined time, malt  
10 obtained by a germination step as supplier for oligosaccharide is included in the food or food products as a part of materials thereof.

According to claim 1, after seed of one or more of wheat, barley, oats and rye are soaked in  
15 water or hot water for a predetermined time, by including malt obtained by a germination step as supplier for oligosaccharide in the food or food products as a part of materials thereof, it is possible to provide a method of processing food or  
20 food products which include high oligosaccharide contents without adding the oligosaccharide itself; as a result, food or food products which include high oligosaccharide contents can be provided.

Additionally, as described in claim 2, in  
25 the method of processing food or food products as claimed in claim 1, the oligosaccharide content in malt is adjusted by controlling a mixing ratio of the malt.

According to claim 2, by controlling the  
30 mixing ratio of the malt, it is possible to provide a method of processing food or food products which adjusts oligosaccharide contents in malt without adding the oligosaccharide itself; as a result, food or food products which include high oligosaccharide  
35 contents can be provided.

Additionally, as described in claim 3, in the method of processing food or food products as

claimed in claim 2, the oligosaccharide is one or more selected from a group comprising maltotriose, maltotetraose, maltopentaose and maltohexaose.

According to claim 3, without adding  
5 oligosaccharide itself, it is possible to provide a method of processing food or food products which include high maltotriose, maltotetraose, maltopentaose and maltohexaose contents in malt; as a result, food or food products which include high  
10 oligosaccharide contents can be provided.

In order to achieve the above-mentioned object, as described in claim 4, there is provided food or food products with the methods as claimed any one of claims 1-3.

15 According to claim 4, by using the method as claimed any one of claims 1-3, it is possible to provide food or food products which include high oligosaccharide contents that can be provided without adding oligosaccharide itself.

20 According to the present invention, it is possible to provide food or food products which include high oligosaccharide contents without adding the oligosaccharide itself but by using malt obtained by a germination step, in which step seed  
25 of one or more of wheat, barley, oats and rye as a part of materials for food or food products are soaked in water or hot water for a predetermined time.

Other objects, features and advantages of  
30 the present invention will become more apparent from the following detailed description.

#### BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a graph showing composition of  
35 sugars of bread flour and malt flour; and

Fig. 2 is a graph showing a change of composition of sugar during the bread manufacturing

process.

#### DESCRIPTION OF THE PREFERRED EMBODIMENTS

5 A description will now be given, with  
reference to the embodiments according to the  
present invention.

10 According to inventors of the present  
invention, it is recognized and reported that GABA  
and other free amino acids oligosaccharide contents  
in foods are increased by using malt, for example  
barley malt obtained by a germination step, in which  
step seed of one or more of wheat, barley, oats and  
rye as a part of materials for food or food products  
are soaked in water or hot water for a predetermined  
15 time. Here, by using malt as a part of food  
materials, experiments were performed, in which  
experiments how composition of the sugar of foods is  
influenced was examined.

20 First, each composition of sugar in bread  
flour and malt flour was measured. Malt was  
manufactured through the manufacturing step  
(hereinafter, called soaking, germination, and  
roast-dry processes) of the barley malt as material  
for beer and low-malt beer.

25 In general, soaking, germination, and  
roast-dry processes comprise a soaking process, a  
germination process, and a roast-dry process. In  
detail, barley is soaked in water or hot water and  
water is absorbed (soaking process); next, the  
30 soaked barley is germinated (germination); and after  
allowing biosynthesis of an enzyme and decomposition  
of a part of a storage substance during the above  
process, the resulting products are heat-dried  
(roasted-dry) to allow for producing malt. Also,  
35 according to the research of the inventors, since  
the roasted-dry process is a kind of dry process, it  
was recognized that functional ingredients like free

amino acids and dietary fibers contents are changed. Thus, there is a possibility of changing the oligosaccharide content, and it might be processed to change the oligosaccharide content in malt not  
5 with heat-drying but with freeze-drying. Next, malt was crushed into malt flour, and the composition of sugar was measured compared to bread flour. As a result, it was recognized that there was no difference between samples of maltose content, but  
10 detected other sugar contents were more prevalent in malt flour. On the other hand, oligosaccharides other than maltotetraose could not be detected in any samples.

Moreover, malt flour was mixed with bread  
15 flour, and food was manufactured. Then, a change of composition of sugar during the manufacturing process was measured. Comparing composition of sugars in roll-breads manufactured with various mixing ratios, specific oligosaccharides such as  
20 maltotriose were increased depending on the mixing ratio, and oligosaccharides like maltotetraose, maltopentaose and maltohexaose, which were not detected in materials and dough right after fermentation, were drastically increased after the  
25 baking step.

As a result of the above, during the manufacturing process of food which is mixing barley malt with the food materials, it was recognized that oligosaccharides which are not included in materials  
30 are produced, and as the mixing ratio is increased more, these oligosaccharides are produced more.

Therefore, according to an embodiment of the present invention, oligosaccharide content in food can be increased by using malt obtained through  
35 the germination of seeds of one or more of wheat, barley, oats and rye like barley malt as material.

Below, embodiments of the present

invention will be described in more detail.

#### First Embodiment

Composition of each sugar for bread flour and malt flour

5           Compositions of sugar for bread flour and malt flour were measured. Malt (Haruna Niho) as material for malt flour was manufactured by soaking, germination and roast-dry processes of pilot samples in accordance with standard methods of The Sapporo  
10           Breweries Ltd.. Malt of germination the 6<sup>th</sup> day during the germination process was crushed into powder and malt flour was manufactured. The powdered samples of 20 mg/800  $\mu$ l distilled water were shaken overnight at 5 °C, then composition of  
15           sugar was measured with an analyzer for composition of sugar (DIONEX). According to figure 1, there was no difference between samples for maltose content, but detected other sugar contents were more  
20           prevalent in the malt flour. Also, oligosaccharides which have high molecular weight other than maltotetraose could not be detected in any samples.

#### Second embodiment

Roll breads were manufactured by mixing 0%, 0.36%, 10% and 20% of the malt flour as in the first  
25           embodiment with bread flour. Conventionally, the most popular mixing ratio of malt flour is 0.36% during the bread manufacturing (Briggs, Malts and Malting, 1998, p.9). Bread was manufactured with these materials, and a change of composition of  
30           sugar during the bread manufacturing process was measured. Figure 2 shows a change of composition of sugar during the bread manufacturing process.

35           Compared to 0% malt flour, it was recognized that maltose content increased in each bread (after baking) for 0.36%, 10% and 20% malt flour, but there was no big change depending the mixing ratio of malt flour. On the other hand,

maltotriose in bread was increased depending on the mixing ratio of malt flour. Also, maltotetraose, maltopentaose and maltohexaose were not detected in materials and dough right after fermentation, but  
5 for 10% and 20% malt flour, which mixing ratios of malt flour are much bigger than 0.36%, maltotetraose, maltopentaose and maltohexaose were drastically increased in bread after the baking step.

According to the above result, it is  
10 recognized that oligosaccharide content in food is increased by using malt flour with a high mixing ratio compared to the conventional method.

The present invention is not limited to the specifically disclosed embodiments, and  
15 variations and modifications may be made without departing from the scope of the present invention.

The present application is based on Japanese priority application No.2003-430583 filed on December 25, 2003, the entire contents of which  
20 are hereby incorporated by reference.